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Relationship Between Self-Reported Oral Health and Self-Esteem in Two Columbia, SC Populations

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RELATIONSHIP BETWEEN SELF-REPORTED ORAL HEALTH AND SELF-ESTEEM IN TWO COLUMBIA, SC POPULATIONS

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Thesis Summary

As such an important influencer of not only smiling, but also talking and facial expressions, it is no surprise that oral health has been linked to self-esteem. Behaviors associated with the mouth affect communication, and as a result, interaction with others. Those with better oral health appear to have better experiences with human interaction, and consequently, higher self-esteem (Huff, Kinion, Kendra, & Klecan). In an even broader sense than simply its effect on human interaction, research has shown that when oral health is compromised, overall health, mental health, and quality of life may be diminished as well (Appollonio, Carabellese, Frattola, & Trabucchi, 1997). In recognizing the relationship between oral health and the many different components of overall health, the need for dental care becomes increasingly clear. Unfortunately, for many low socioeconomic status individuals, dental care is extremely expensive and often not covered by insurance providers. A system of free clinics exists to provide emergency care for those without access to other care, but these clinics generally cannot meet most of the dental needs for low income adults. In addition to those under financial stress, other types of stress can also result in health issues—making college students another population vulnerable to poor oral health. The background research obtained for this thesis included information on the relationships between oral health and overall health, self-esteem and overall health, self-esteem and oral health, self-esteem and socioeconomic status, and socioeconomic status and oral health. Information was also gathered on dental insurance and Medicaid, free health clinics, and dental care in college.

As oral health is known to be a critical component of one's overall health, this thesis attempts to explore the link between oral health and self-esteem in two Columbia, SC populations. The null hypothesis for the study is: there will be no significant difference between

the Rosenberg Self Esteem Scale scores of those who self-report low and high oral health. In addition, some alternative hypotheses will also be presented. Those who report higher income will report higher oral health. High income individuals will also report high self-esteem scores. Thus, the researchers expect that those with high self-reported oral health, as well as those that report extra procedures done, will report high self-confidence.

The university sample of the study consisted of 259 University of South Carolina students. Of these participants, a large majority were white females of a high socioeconomic status. The average age range was between 18-22. The community sample consisted of 29 participants from both the Columbia Free Clinic and Swansea Dental Care's Free Dental Day. Many of these participants lacked health insurance, and were of a low socioeconomic status. The average age of this sample was 47, and ranged from 23-68. The materials used included a consent form for participation in a research study, questions from the Rosenberg Self-Esteem Scale, oral health survey questions developed by the American Dental Association's Health Policy Institute, demographic questions, and a study summary. The university sample completed the survey via Google Forms, and they received extra credit for their psychology class upon completion. The community sample completed printed surveys in the waiting room of either the Free Clinic or Swansea Dental Care. Free clinic patients received a $5 gift card upon completion, and Swansea Dental Care patients completed the survey as part of their paperwork prior to receiving a free extraction. The data from the paper surveys was input into Google Forms by the researcher so that all of the data was in the same place.

The results indicated that, in general, participants scored highly on the Total Oral Health score, with few having very poor oral health. The distribution of Rosenberg Self-Esteem Scale scores was bell-shaped, with some low and very high, but most reported moderate levels of self-

esteem. Several t-tests indicated that females had significantly lower self-esteem than males, perhaps because of societal pressures to look good. The community sample also scored much lower on oral health than USC students, which is not surprising considering they reported lower income and lack of access to care. Most importantly, multiple regressions models showed that oral health was significant in predicting self-esteem, as predicted by other studies; however, income was not significant in predicting self-esteem, perhaps due to more knowledge of finances and the very wealthy. Income was significant in predicting oral health, as expected, as dental care is expensive and proper care is unaffordable to those without means. The number of dental procedures received was not significant in predicting oral health, as many procedures may indicate that there is often disease in the mouth; however, having more cosmetic procedures done and perceiving oral health to be good was significant in predicting oral health. Dental insurance and highest level of education was most significant in predicting total oral health, as those with the more education and knowledge, as well as more means, are most likely to have better oral health overall.

This project was limited in that the sample consisted of far more females than males, which may have skewed the results. Additionally, the non-privacy of paper surveys could have led to falsely inflated self-esteem scores. Next, the community sample may not have cared as much as university sample about the appearance of their smile because they are typically surrounded by people who also lack oral health/hygiene, which may have skewed results. The researchers could have included more specific questions to gage how important the appearance of the mouth was to participants. The order of the self-esteem questions and the oral health questions may also have limited the results of the study. A significant limitation was that the sample was fairly homogenous, with white, college-educated, higher-income individuals

comprising most of the sample. Finally, a question was accidentally left off the Rosenberg Self-Esteem Scale, which may have limited the accuracy of the self-esteem scores.

Moving forward, future studies could be created to address the limitations of the present study. For instance, the complete Rosenberg Self-Esteem Scale could be used, more targeted questions gaging the importance of aesthetics could be incorporated in the existing survey, the order of the oral health questions and the self-esteem questions could be switched, and the sample could be more heterogeneous and larger. Additionally, researchers believe that using a dentist to evaluate oral health instead of self-reports would increase the accuracy or results and decrease the subjectivity of the data.

Abstract

The importance of oral health to overall health cannot be overstated. For example, oral health can be used for early diagnosis of diseases such as diabetes. Furthermore, it has been well studied that self-esteem is related to oral health. Individuals with proper oral health care have more confidence to interact with others, which results in higher self-esteem. Those who lack the ability to pay for oral healthcare are thus at a great disadvantage. The present study sought to investigate the relationship between oral health and self-esteem in two Columbia, SC populations through surveying. There were two study populations, students at the University of South Carolina and low-income adults at the Free Clinic and a free dental day at Swansea Dental Care. 288 individuals were surveyed on oral health, self-esteem, and demographics. Predictor variables included income, dental insurance, health insurance, number of cosmetic and high-risk procedures, and highest level of education. Results of the analysis indicate that there is a relationship between oral health and self-esteem in this population. Dental insurance and education together predicted oral health most closely. Surprisingly, income did not predict self-esteem. Overall, the results highlight the necessity for accessibility to proper oral health care in order to ensure not only physical health, but mental health as well.

Introduction

Because the mouth, and more specifically the smile, are such integral parts of the face, it is no surprise that individuals with poor oral health have been found to have lower self-esteem. Recent studies have shown that dental health influences not only smiling but also talking and facial expression (Huff, Kinion, Kendra, & Klecan, 2006). These behaviors affect communication, and as a result, interaction with others. Those with better dental health appear to have better experiences with human interaction, and consequently, higher self-esteem. When oral health is compromised, research points to the idea that overall health, mental health and quality of life may be diminished as well (Appollonio, Carabellese, Frattola, & Trabucchi, 1997). Oral health is highly related to overall health, and can actually be a means to catch diseases such as diabetes early. Mental health, and specifically self-esteem, are also integral to overall health, as motivated, mentally sound individuals are best able to observe proper health habits. Both oral health and self-esteem have been found to be negatively related to socioeconomic status; poorer individuals are less likely to have proper oral hygiene and also less likely to view themselves highly. Unfortunately for many low SES individuals, dental care is typically expensive, and most are not covered under dental insurance. Furthermore, dental coverage under Medicaid is often lacking. In sum, low income adults have a very difficult time obtaining proper dental care, which may lead to lower self-esteem. A system of free clinics has developed to provide emergency care for those without means, but typically these clinics cannot meet all dental needs for low income adults. In addition to financial stress, other types of stress can also cause health issues. It is for this reason that college students, who typically experience high levels of stress, are another population vulnerable to poor oral health.

Oral Health and Overall Health

Contrary to popular belief, dental care is not only for aesthetics and tooth pain but also extremely important to one's overall health. A physical examination of the mouth and face can reveal signs of disease, drug use, physical abuse, harmful habits, addictions, and general health status (National Institute of Dental and Craniofacial Research, 2014). Problems in the mouth can affect the rest of the body; therefore, oral health and overall health are inextricably linked (Mayo Clinic, 2017). According to new research, a healthy mouth may aid in warding off medical disorders. On the other hand, an unhealthy mouth may increase the risk of serious health problems such as heart attack, stroke, poorly controlled diabetes, and preterm labor (Colgate, 2017). The mouth is a window into the rest of the body, serving as a vantage point for detecting early signs and symptoms of systemic diseases. Conditions such as AIDS or diabetes often first become apparent as mouth lesions or other oral problems. The Academy of General Dentistry, in fact, states that more than 90% of all systemic disease produce oral signs and symptoms (Colgate, 2017). With growing evidence in recent years, the link between oral health and overall health has become increasingly clear.

The mouth, specifically saliva, acts as an important diagnostic tool for many doctors when attempting to detect drug abuse, hormonal changes, and specific diseases (National Institute of Dental and Craniofacial Research, 2014). For example, cortisol levels in saliva are used to test for stress responses in newborn children. Additionally, fragments of certain bone-specific proteins found in saliva have proven to be useful in monitoring bone loss in women and men prone to osteoporosis. Even cancer markers are detectable in saliva (Colgate, 2017). It has been projected that in the future, diseases like Parkinson's disease, cirrhosis of the liver, and other infectious diseases may be diagnosed and monitored using saliva testing instead of blood

testing (Colgate, 2017). In addition to acting as a diagnostic tool, saliva also acts as a protective agent against harmful invaders. Saliva contains antibodies that attack viral pathogens, such as the common cold and HIV. It also contains proteins called histatins, which inhibit growth of naturally occurring fungus and ultimately prevent the fungal infection called oral thrush. Furthermore, saliva contains enzymes that destroy bacteria by degrading bacterial membranes and inhibiting the metabolism and growth of bacteria (Colgate, 2017).

Like so many other areas of the body, the mouth is teeming with bacteria. The body's natural defenses, in conjunction with good oral health care, can keep these bacteria under control; however, lack of proper oral hygiene can allow plaque to build up along the gum line, creating an environment for additional bacteria to accumulate between the gums and teeth, leading to tooth decay and gum disease (Mayo Clinic, 2017). The gum infection that occurs subsequently to poor oral hygiene is known as gingivitis, and can potentially lead to a more serious gum infection called periodontitis (Colgate, 2017). Recent epidemiologic and experimental animal research have provided evidence of possible associations between oral infections, specifically periodontal disease, and diabetes, cardiovascular disease, and adverse pregnancy outcomes (National Institute of Dental and Craniofacial Research, 2014). If a person has diabetes, they are already at an increased risk of developing gum disease. Furthermore, chronic gum disease may make diabetes more difficult to control. Periodontal disease may cause insulin resistance, which disrupts blood sugar control and makes diabetes less manageable for the sufferer (Colgate, 2017). Cardiovascular disease is also affected by gingivitis and periodontal disease. Research has shown that bacteria in the mouth may cause inflammation throughout the body, including the arteries. This inflammation may lead to the development of atherosclerotic plaques in the arteries, increasing the risk of heart attack or stroke (Colgate, 2017). Adverse

pregnancy outcomes such as preterm birth have also been linked to severe gum disease. The theory stands that oral bacteria releases toxins which reach the placenta through the mother's bloodstream and interfere with the growth and development of the fetus. Subsequently, the oral infection causes the mother to produce labor-triggering substances too quickly, potentially triggering premature labor and birth (Colgate, 2017).

While many oral health conditions can lead to more generalized health problems, the opposite is also true. For instance, HIV/AIDS is known to cause oral problems, such as painful mucosal lesions. Osteoporosis, which causes bones to become weak and brittle, is also thought to be linked to periodontal bone loss and tooth loss. The drugs used to treat osteoporosis are additionally known to carry a risk of damage to the bones of the jaw (Mayo Clinic, 2017). As it reduces the body's resistance to infection, diabetes has the tendency to cause oral health problems such as gum disease. Worsening oral health is also seen in those with Alzheimer's disease as the disease progresses. Other conditions that are thought to be linked to poorer oral health include eating disorders, rheumatoid arthritis, head and neck cancers, and certain autoimmune diseases (Mayo Clinic, 2017). This marked relationship between oral health and overall health provides a strong impetus for the promotion of good oral health measures and maintenance of proper oral hygiene.

Self-Esteem and Overall Health

While physical health is the more widely recognized component of one's overarching health, maintenance of good mental health is just as integral to overall health. The World Health Organization defines health "as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity…there is no health without mental health" (Canadian Mental Health Association, 2017). Associations between mental and physical health

include: poor mental health is a risk factor for chronic physical conditions; people with serious mental health conditions are at a high risk for experiencing chronic physical conditions; and people with chronic physical conditions are at risk of developing poor mental health. The social determinants of health impact both chronic physical conditions and mental health (Canadian Mental Health Association, 2017). One aspect of mental health that professionals have found to be an important construct receiving considerable attention in the study of mental health problems is self-esteem. Self-esteem may be defined as the totality of perceptions that each person has of himself (Johan, Tine, Hanne, & Michel, 2017). Positive self-esteem is considered a basic feature of psychological well-being, while low self-esteem is thought to play a critical role in the development of psychopathology (Johan et al., 2017).

An individual's self-esteem begins to form early, and is continually modified and updated. Positive self-esteem comes from learning to accept oneself by observing one's insufficiencies and choosing to remain positive. Self-esteem tends to grow with each successful experience and interaction. Adequate self-esteem is important in allowing individuals to believe that they can handle their life—and handle it well. A sense of self-liking and feelings of competence are the foundations upon which mental health rests (Newman, n.d.).

Making healthy choices is difficult if people do not feel in control of their environment and their own personal circumstances. An important concept in relation to this idea is that of empowerment, which encompasses self-esteem and self-confidence/self-efficacy. Self-esteem can be viewed as an attitude; one that has to do with a person's evaluation of himself as whole—as a person of worth (Dumitrescu, Zetu, & Teslaru, 2012). Self-confidence, in turn, has to do with beliefs about one's general ability to handle situations and problems in the world, and can also refer to one's ability to handle a specific task (self-efficacy) (Dumitrescu et al., 2012).

Professionals view self-esteem as invaluable because individuals are seen as good for what they can do as well as who they are. These two components of self-esteem are known as self-competence and self-liking. Self-competence is the recognition of oneself as a causal agent—an intentional being that can bring about desired outcomes. Ultimately, self-competence refers to the overall positive or negative conception of oneself as a source of power and efficacy (Dumitrescu et al., 2012). Furthermore, self-liking refers to the overall assurance that individuals have it in their ability to achieve their goals. (Dumitrescu et al., 2012). The higher an individual's self-esteem, the greater their empowerment. An empowered individual is in a much more favorable decision to make healthy choices because they feel as if they have control of their environment and their own personal circumstance. Researchers assert that self-confidence and self-esteem are two of the most influential motivators and regulators of behavior in people's everyday lives, and are thus integral components of overall health (Dumitrescuet al., 2012).

Self-Esteem and Oral Health

Researchers have shown that those with poorer oral health are at greater risk for being self-critical (Dumitrescu, Zetu, Teslaru, Dogaru, & Dogaru, 2008). It is not clear, however, if poor oral health is the cause of poor self-esteem, or the other way around. Another study revealed that individuals who indicated they had a low degree of self-esteem were significantly more at risk of having poor oral health behavior than those with a high level of self-esteem (Flinck, Kallestal, Holm, Allebeck, & Walls, 1999). Research also revealed significant differences in the instability of self-esteem, self-confidence, self-competence, and self-liking scores in relation to perceived dental health and satisfaction with appearance of own teeth (Dumitrescuet al., 2012). The researchers concluded that high self-esteem can generate feelings of worthiness and self-confidence, which can promote good self-care. On the other hand, success

in self-care could strengthen self-esteem (Dumitrescu et al., 2012). The aforementioned study also revealed that brushing teeth regularly, as well as daily use of dental floss and mouthwash, was associated with a persevering character—that stable self-esteem is needed to adequately perform these self-care practices to obtain long-term advantages. As oral health behaviors were analyzed, an association between both self-liking and self-competence and flossing, tooth-brushing, and dental visits was demonstrated (Dumitrescu et al., 2012). Thus, if a causal relationship exists, the correction of causality is not clear.

With regards to age-related factors, one study indicated that in both boys and girls, self-esteem is strongly associated with tooth brushing frequency (Honkala, Honkala, Al-Sahli, 2007). The same study highlighted self-concept, asserting that it plays an important role in mediating changes in dental health behavior. The study concluded that pupils who did not feel happy, felt lonely often, felt that other pupils did not accept them, or felt that it was difficult to make friends, were more prone to brush infrequently than other pupils were (Honkala et al., 2007). A related study with adolescents indicated that self-concept, which refers to high self-esteem and high internal locus of control, was significantly correlated with tooth brushing frequency among both adolescents and adults (Honkala et al., 2007). In comparison, a study focused on an older community highlighted loss of teeth as an increasingly common problem which has a measurable impact on daily living. In this population, denture status was related to quality of life—subjects with missing teeth who did not wear dentures had lower oral health-related quality of life scores than those who wore either removable or complete dentures. According to other related studies, wearing dentures helps rehabilitate the oral health status for older people by improving chewing ability and making oral health functions better, thus improving quality of life (Appollonio,

Carabellese, Frattola, & Trabucchi, 1997). The results of these studies illuminate that oral health and self-esteem are related whether a person is young or old.

SES and Self-Esteem

Many studies have investigated the link between socioeconomic status (SES) and self-esteem, with varying and often divergent results. In these studies, the definition of SES often includes educational attainment, income, occupation, or a combination of these factors. These SES indicators are combined into one theoretical rubric, measuring social class and social status. In short, SES is roughly a reflection of the inequality between different status groups—categories of people with unequal amounts of prestige (Gerth & Mills, 1946).

In 2002, a meta-analytic study attempted to clarify the relationship between socioeconomic status and self-esteem by summarizing the results of 446 studies, totaling 312,940 participants, on self-esteem and SES (Twenge & Campbell, 2002). Their meta-analysis showed that SES has a small, but significant, positive relationship with self-esteem; higher SES individuals, on the whole, report higher self-esteem. Apart from this general relationship, the authors were able to investigate more deeply. The large sample of participants allowed the authors to investigate various modifiers for the relationship between SES and self-esteem, such as age and gender. They found that at a young age, the effect of SES on self-esteem is very small; however, this effect increases rapidly during young adulthood and into middle age, and then decreases for older adults above the age of 60. The authors posit that this is due to the difference between ascribed and earned SES. While it may be assumed that children from low SES background would have low self-esteem, the data showed otherwise. According to Twenge and Campbell, the smaller correlation for children may occur because their SES is not earned (2002). As one moves into adulthood, higher SES can be earned through work and education,

which may result in higher self-esteem than simply being ascribed status. This relationship reflects results found decades earlier by Rosenberg and Pearlin; their results also indicated a very minimal association for younger children, a modest association for adolescents, and a moderate association for adults (1978).

This argument is strengthened by the fact that the authors found that women's birth year affects the relationship between their SES and self-esteem. For older women, SES was generally a result of the work of a husband, thus, SES was more ascribed than earned, and there was little relationship with self-esteem; however, for younger women, who generally worked much more, SES was earned, and the relationship with self-esteem was much stronger. Furthermore, they found that occupation and education, regardless of gender, produce higher correlations with self-esteem that does income alone.

The evidence from the moderators of the SES/self-esteem relationship described above point to a view of how self-esteem operates within the individual. "For self-esteem, it is not enough to simply enjoy the perks of high status; one must have had something to do with it" (Twenge & Campbell, 2002). This leads to the conclusion that self-esteem is more dependent on one's purposeful actions and choices, resulting in higher status and thus affirming one's self-worth, than passively inherited status, which does not necessarily preclude satisfaction with oneself.

SES and Oral Health

Many studies have shown that lower SES is linked to worse oral health outcomes worldwide, including studies in the England, Wales, Northern Ireland, Australia, and Sweden (Steele et al., 2015) (Armfield, Mejía, & Jamieson, 2013) (Guarnizo-Herreño et al., 2014) (Molarius, Engström, Flink, Simonsson, & Tegelberg, 2014) (Mejíra, Armfield, & Jamieson,

2014). Given the population of this study will be primarily American, the focus of this section will be on the situation in the United States.

Although the situation has improved in the last decades, notable gaps and disparities still exist in access and care (U.S. Health and Human Services [HHS], 2000). Low income, low SES individuals and families, as well as minorities, are affected by oral health problems at a disproportionately high rate. In the general population of the United States, among those age 19-64, 26% of adults have untreated dental caries. Among those adults below 100% of the federal poverty level (FPL), the rate of untreated cavities is more than three times that of adults above 400% FPL (KCMU, 2012). When comparing the most recent dental visit, low-income adults are less likely to have visited a provider within past year; in 2010, only 42% of adults under 200% FPL had visited a dental provider in the last year, compared to 70% likelihood for those above 200% FPL (KCMU, 2012). Furthermore, over 20% of low-income adults indicated they had not visited a dentist in five years or more, or had never visited a dentist at all (KCMU, 2012).

These poor oral health outcomes largely stem from a lack of resources to pay for dental services out of pocket. Compounded by a lack of dental insurance, this prevents many low-income U.S. residents from being able to receive proper dental care. Other factors disadvantage these populations as well. Lack of water fluoridation, which has been proven to reduce the incidence of dental caries, is most prevalent in low-income and minority communities (Kaiser Commission on Medicaid and the Uninsured [KCMU], 2012) Furthermore, low-income adults may not have transportation available to a dental provider, nor the flexibility to take time off of work for treatment (HHS, 2000). When dental issues do arise, not only are low-income adults not able to get treatment, but they may also suffer more financial fallout as a result of pain. Adults who work in lower-paying industries, such as customer service, lose 2 to 4 times more work

hours due to oral health related issues than adults who have professional positions (Snyder & Gehshan, 2008).

Dental Insurance and Medicaid

We can gather that dental outcomes are much poorer for low-income Americans than for higher SES groups, largely as a result of their disadvantaged economic position. The lack of dental coverage through government programs or private insurance plays a big role in the lack of affordability of dental care for low-income individuals and families.

Although spending on dental services in the United States totaled over $100 billion in 2009, this was only about 5% of total health care expenditures (Center for Medicaid and Medicaid Studies [CMS], 2011). Private insurance covers half of dental spending, while another 42% is paid for out-of-pocket by consumers (CMS, 2011). Neither of these options are readily available to low-income adults, who do not have the financial means to afford either option. The remaining 10% of national dental spending is paid for by Medicaid and other government programs, which benefit mainly low-income Americans.

While the United States' lack of health coverage for low-income adults has been widely discussed, nationally, there are three people lacking dental coverage for each person lacking health coverage. Many low-income adults lack access to private health insurance because of cost, but for those that do have private insurance, dental services are frequently not covered, or cost-sharing is high, leaving them unable to seek proper care (Snyder & Gehshan, 2008). Those near the poverty line are especially unlikely to have any private dental insurance. In fact, even among adults with incomes above 200% FPL, only two thirds have private dental coverage (KCMU, 2012). In 2009, among all adults age 19-64, fewer than half had private coverage for dental care, leaving only the options of fully out of pocket payment or a lack of care (KCMU, 2012).

While coverage of dental care for children in Medicaid is mandated by federal law, coverage of adult dental services is left as an option for the states. The majority of state Medicaid programs do not cover comprehensive dental benefits for adults, thus low-income adults largely go without needed preventive and primary oral health care (KCMU, 2012). Some states cover dental exams and cleanings for adults; however, many among these states require copayments that may not be financially possible for the low-income adults they are intended to serve. The parameters for the amount, duration, and scope of benefits is also left to the states, resulting in divergent coverage across the country.

Nearly every state provides at least some dental benefits for adults under Medicaid, but close to half of the states only cover care for emergency cases or pain relief for injuries, trauma, and extractions (KCMU, 2012). This means that those adults covered under these plans do not receive preventative care or treatment for less extreme cases. Some states do cover preventative exams and or hygiene cleanings; however, they often do not cover the restorative dental procedures needed to fix decay, such as crowns or root canals (KCMU, 2012). This leads to a situation where the patient knows of the problem, but is helpless financially to do anything about it. In addition, states may choose to limit their coverage of dental procedures to a specific dollar amount or cap the number of a certain procedure that they will cover. Overall, low-income adults have a difficult time affording proper, comprehensive dental care. The lack of consistent or comprehensive coverage continues to leave adult Medicaid enrollees without necessary care and unable to pay for the high-cost procedures their oral health may require.

In addition, when states are faced with budget constraints, adult dental services in Medicaid care tend to be among the first set of cutbacks (Smith et al., 2011). In one example, California and Massachusetts cut Medicaid adult dental benefits in response to budget pressures,

which was followed by negative outcomes for beneficiaries. In both states, the number of enrollees utilizing dental services or seeking dental care dropped dramatically. On top of this, the number of dental providers participating in Medicaid decreases significantly due to the lack of benefits (Pryor & Monopoli, 2005). Many adults in the Medicaid system had little choice but to avoid going to the dentist for lack of means, resulting in pain due to untreated oral health conditions. Even at historical safety-net providers, low-income adults were often unable to access care (Pryor & Monopoli, 2005). The lack of coverage under private insurance or Medicaid makes dental care out of reach for many low-income adults. Ultimately, adults with any health insurance are 22% likely to have untreated caries versus 43% for uninsured adults (KCMU, 2012). This underscores the importance of insurance for accessibility to dental care. Without financial assistance, low-income adults often cannot afford the expensive dental services necessary for keeping their oral and dental health at a reasonable level.

Free Health Clinics

As stated above, many in low SES situations cannot afford proper health care, nor dental care. Fortunately, a network of free clinics has developed throughout the country, with the purpose of providing care for those without means to pay for the traditional medical system. Many of these clinics also have a dental component, which, in addition to some free-standing free dental clinics, provide oral health care to those who cannot pay for care otherwise.

While these clinics have not been largely studied in academics, one 2010 study sought to describe the free clinic system and its contribution to the safety net in the U.S. A survey was mailed to all known free clinics in the United States, the first such census in 40 years (Darnell, 2010). 1007 clinics responded, at a 75% response rate, operating in 49 states and the District of Columbia. According to responses, these clinics care for 1.8 million people annually, providing

3.5 million medical and dental visits (Darnell, 2010). A majority, 58.7%, received no support from the government, and the average operating budget was a low $287,810. The clinics were open for only a mean of 18 hours per week, limiting the amount of care they could provide. Funding was generally not available to pay for full-time doctors or dentists, and thus hours are restricted to those that willing practitioners can volunteer (Darnell, 2010). Chronic disease management, urgent care, physical examinations, and medications were found to be the primary functions of free clinics. Thus, while those without insurance or financial wherewithal are not completely neglected, the lack of funding and restricted hours for free clinics means that care is often minimal and may be hard to come by for potential low-income patients.

A considerable number of dentists volunteer their time, either at the free clinics mentioned above, or at their own office. A 1996 survey of Dallas dentists found that 40.6% of the 225 respondents volunteered services in their own office, and 44% volunteered at a community health clinic that hosted volunteers (McFayden, Seidler, Shulman, & Wells, 1996). The needs of patients at free clinics are often related to basic oral hygiene, like caries or decay, and general dentists can easily fix these problems with fillings, other restorations, or extractions. As a reflection of this, the majority of those who reported volunteering their time were private-practice general dentists (McFayden et al., 1996). At their own dental offices, 67.6% of dentists reported providing care to elderly patients with low income at a reduced rate or for free, 55.6% reported providing care to low-income patients without age restriction, and 60.9% cared for patients of record who were in a temporary financial hardship (McFayden et al., 1996). From these studies, it can be seen that free dental work is in some cases accessible to those in need, although there are often limits to what procedures a dentist will do at a reduced rate.

Unfortunately, many patients in need of care may not be aware of the availability of subsidized or free options. One study found that subjects unaware of the availability of such options were 4.6 times as likely to pay fully out of pocket for dental care than those who did know (Bayat, Vehkalahti, Murtomaa, & Tala, 2010). Another factor in the choice of a private dental office was interpersonal factors. Subjects reported feeling more comfortable and reassured by the dentist and staff when they were at a private clinic versus at a community clinic that provided free or highly subsidized care (Bayat et al., 2010). Despite the willingness of dentists to provide free or subsidized care, barriers still exist to care for the populations that need it.

Intersection of Factors

With regard to socioeconomic status, there is now substantial evidence of socioeconomic disparities in oral health relating to self-esteem in most developed nations (Locker, 2009). Studies have provided detailed data on the extent of income disparities in both clinically assessed and self-perceived oral health—in all instances, low-income subjects had the worst oral health outcomes. Evidence is emerging that those at the lower end of the socioeconomic scale experience more functional and psychosocial impacts than those higher up on the socioeconomic scale even after controlling for levels of oral disease and impairments (Locker, 2009). In a study of Canadian children, scores showed that children from low-income households had poorer oral health-related quality of life. Further analyses of this study revealed that oral disorders had little impact on the health-related quality of life of higher-income children, but a marked impact on lower-income children (Locker, 2007).

According to one researcher, the link between socioeconomic status and oral health outcomes have been explained in three ways (Sisson, 2007). First, income has a direct effect on the ability to access goods, services, and other resources that promote health. Second, there is an

indirect mechanism in terms of differential exposure to risk factors and health behaviors. Third, the relationship between socioeconomic status and health may be the outcome of differences in psychological assets and psychosocial resources (Sisson, 2007). It is this third explanation that links self-esteem to oral health—and many studies have been performed to provide evidence in support of this explanation. One researcher performed a study using Oral Health Impact scores to show that sense of control, social support, chronic stress, and life satisfaction were predictive of self-perceived oral health (Sanders & Spencer, 2004). Another researcher suggested that inequalities, such as those of opportunities, life chances, and achievement, are accompanied by inequalities of respect and self-esteem. In turn, low self-esteem and other psychosocial threats are associated with health-damaging behaviors (Marmot, 2003). From the many studies performed, it is apparent that socioeconomic status plays a role in both self-esteem and oral health status.

Dental Care in College

Another population vulnerable for poor oral health outcomes are college students. Moving away from home and into a new, academically challenging environment brings new stresses into the life of a student, which can also affect oral health outcomes. A study by Pedersen (2005) found that college students are subject to increased stress from many distinct sources. Such stress has been found to have a negative impact on health behaviors, including oral health behaviors (Crabtree, Kirk, Moore, & Abraham, 2016). Increased stress leads to less time and energy to spend on maintaining healthy habits, like tooth brushing and flossing. Students, without prompting from parents, sometimes fail to give these important behaviors attention, and their oral health, and overall health, suffers as a result.

A study on the general health behaviors of college students elucidates this phenomenon (Bailey-Davis, Maggs, Morgan, & Small, 2012). In their study, 608 college students took a survey which aimed to investigate about health behaviors during their semesters at college. The results showed that students often did not practice critical health behaviors during their college careers. Their diets particularly suffered, as most students consumed at least 1 sugary drink each day yet did not eat 3 servings of fruits or vegetables. These eating behaviors are detrimental to overall health, but particularly to oral health, as sugary drinks have been shown to correlate heavily with caries (Cheng, Yang, Shao, Hu, & Zhou, 2009). Furthermore, students also participated in unhealthy habits which further affected their health. Pederson (2005) discovered that college students increased their drinking of alcohol, including binge drinking, and decreased their hours of nightly sleep, as a response to increased stresses at college.

Although the stresses of college can be detrimental to health, researchers have stated that undergraduate years are a prime period for developing positive health behaviors. Whereas parents may have dictated or influenced health habits while at home, the student can now independently decide how to manage their health. The behaviors that college students choose to follow can set the foundation for health advantages throughout life, or increase disease risk across the lifespan (Bailey-Davis et al., 2012). Education about proper health care habits are particularly effective. One study found that higher oral health literacy was associated with better oral health outcomes in college students (Kanupuru, Fareed, & Sudhir, 2015). Improvements and modifications in health behavior have the potential to last well into adulthood. Unfortunately, researchers found that positive behaviors, such as fruit and vegetable consumption, and physical activity, decreased over the course of the undergraduate career, while unhealthy behaviors, such

as binge-drinking and overeating, increased as the students progressed in college (Bailey-Davis et al., 2012).

Some researchers have identified more optimistic estimates of oral health behaviors in undergraduate students. One study at a Midwestern college investigated the oral health care behaviors and perceptions of students and found that students overall exhibited strong oral health behaviors, such as tooth brushing and regular dental visits (Crabtree et al., 2016). . Furthermore, the authors found less sugary snack and drink intake than expected of normal college-age populations. Although the students did report having higher stress than when they began college, the consensus was that their oral health care was independent of stress levels or time constraints (Crabtree et al., 2016). Despite their struggles with time management, these students made time for proper dental care.

By examining the data from 10 years of ACHA-NCHA surveys, totaling over 1,200,000 responses, Deward (2016) investigated the habits of U.S. college students more generally. The data indicated that following their freshman year, students' dental health care generally declined annually; however, an average of 76.6% of students were found to have gone to a dentist for cleaning in the last year, higher than the general U.S. population (Dewald, 2016). Interestingly, female students were more likely than males to have visited the dentist, and minority populations were far less likely than Caucasians to have visited a dentist. Due to the small number of current studies, there is certainly need for more research on the oral health habits and outcomes of students at U.S. colleges and universities.

Hypotheses

Oral health is a critical component of one's overall health. Not only is it a sign of the progress of total body diseases, but also a reflection of one's self-esteem. Self-esteem is linked to how a person acts, communicates, and thinks about oneself. High self-esteem leads to confidence and higher quality of life. Having proper oral health, and especially extra cosmetic procedures, such as braces and crowns, helps to create a natural looking, bright smile, which is important to self-esteem. Considering the above, the null hypothesis for this study is: there will be no significant difference between the Rosenberg Self Esteem Scale scores of those who self-report low and high oral health. In addition, some alternative hypotheses will also be presented. Those who report higher income will report higher oral health. High income individuals will also report high self-esteem scores. Thus, the researchers expect that those with high self-reported oral health, as well as those that report extra procedures done, will report high self-confidence.

Methods

Participants

There were 259 University of South Carolina students that participated in this study. Of these students, 175 were female and 82 were male. One participant who preferred not to answer was excluded from the data. There were 199white participants, 19 African American/black participants, 13 Hispanic participants, 11 Asian or Pacific Islander, and 24 reported they were two or more races/ethnicities. Students ranged in age from 17 to 41, and most students were within the age range of 18-22 (M = 20.71, SD = 3.93).

Twenty-nine participants were recruited from the secondary populations of the Columbia Free Clinic and Swansea Dental Care's free dental day. The number of males and females was much closer than in the college student population (16 females, 13 males). Of these participants, 12 identified as white, 13 identified as African American/black, 2 identified as mixed race, and 1 identified as Asian. One participant preferred not to disclose race. The participants' ages ranged from 23 to 68 years of age (M = 46.22 , SD = 15.42).

University of South Carolina - Columbia

The University of South Carolina is located in downtown Columbia, SC. Founded in 1801, the university is the largest in South Carolina, with over 34,000 students as of Fall 2017 ("Admitted Class Profile", n.d.). The student body is comprised of 25,556 undergraduate students and 8,543 graduate students. The student body is 53% female and 47% male, and 59% are in-state South Carolina residents, while 41% are out of state residents. A majority of the undergraduate student population, 76.7%, is white. The minority students include: 10.2% African-American, 4.0% Hispanic, 3.2% mixed race, and 2.3% Asian, as well as 0.2% Native American and 0.1% Pacific Islander. No data is provided about average income or age.

Columbia, South Carolina Free Clinic

The Free Medical Clinic, located on Harden St. in Columbia, SC, was organized by Reverend Bill Bouknight and incorporated on April 12th, 1984 (The Free Medical Clinic, 2015). The staff and volunteers of the clinic operate six examination rooms, a pharmacy, a small laboratory, a classroom for patient education and meetings, a waiting room, and offices.

The clinic primarily serves patients from South Carolina's Richland and Lexington Counties, but has seen patients from 23 other South Carolina counties (The Free Medical Clinic, 2015). The clinic specifically aims to provide primary care to those residents who do not have anywhere else to obtain their health care. Most patients that visit the Free Clinic suffer from hypertension, but many also suffer from diabetes, heart disease, and asthma; however, many patients also suffer from chronic diseases and conditions. With the help of a network of volunteer specialty providers, the clinic staff is able to refer patients for specialty care. Additionally, hospitals in the area provide free diagnostic exams, lab tests, x-rays, CAT scans, and MRI exams (The Free Medical Clinic, 2015).

To receive services at the Free Medical Clinic, a person must meet two criteria: first, the person must have no health insurance—no Medicare, Medicaid, VA, or private health insurance. Second, the person must have a household income at or below 175% of the Federal Poverty Level, which in 2017 was defined at $1,759/month for one person, $2,368/month, $2,978/month for three people, and $3,588/month for four people. In order to receive treatment, the patient must bring identification, proof of residence, social security number, and proof of household income (The Free Medical Clinic, 2015).

Swansea, South Carolina

The population of Swansea, South Carolina as of 2014 was 878, and Swansea was categorized as a 100% rural town in 2015 was $31,276, as opposed to South Carolina overall, where it was $47, 238. The city is composed of 54.1% African American/Black individuals, 39.9% white individuals, 1.9% Hispanic individuals, 1.7% American Indian individuals, and 2.2% individuals who claim to be of two or more races. For the Swansea population who are 25 years and older, 87.1% have a high school education, 12.2% have a bachelor's degree, 9.9% have a graduate or professional degree, and 5.2% are unemployed. The most common industries in which citizens were employed in 2015 include manufacturing, retail trade, public administration, transportation and warehousing, construction, educational services, and wholesale trade (City Data, 2017).

Materials

In order to study the relationship between oral health and self-esteem, the researchers created a survey consisting of three parts. To measure oral health, the researchers modified an oral health survey created by the American Dental Association, which asked participants to self-report the condition of their oral health, and to answer questions about their knowledge of oral health. To measure self-esteem, the researchers used the Rosenberg Self Esteem Scale,. Lastly, the researchers designed general demographic questions, based on factors the researchers thought relevant to the study, or that may be related to oral health and self-esteem. The three parts were combined into one survey. Additionally, a consent form, and one question asking the survey taker's status as a University of South Carolina student, were included in the online version of the survey. University students completed the survey online through Google Forms. Community participants completed printed surveys.

Oral Health Survey

The oral health survey used in this study was created by drawing from a questionnaire developed by the American Dental Association's (ADA) Health Policy Institute in early 2015. With help from the ADA Practice Institute and ADA Science Institute, the ADA Health Policy Institute developed a comprehensive survey to assess how Americans view their oral health and how they interact with the current U. S. oral health care system. The survey aims to measure respondents' self-reported oral health status and attitudes toward oral health along with how often they visit the dentist, their insurance status/source of insurance, and potential issues they face accessing oral health services.

When considering oral health status, the creators were specifically interested in aspects such as pain and discomfort, ability to chew and speak, satisfaction with mouth function and aesthetics, and any physical, emotional, and psychological effects related to the condition of one's mouth. The survey examined purely subjective, self-reported measures of mouth pain and discomfort, mouth function, and mouth appearance. To develop the actual survey questions regarding oral health status, the makers reviewed and adopted questions from other established surveys. These surveys included the 2008 National Health Interview Survey, the 2007-2008 National Health and Nutrition Examination Survey, and the 2013 World Health Organization Oral Health Survey (Health Policy Institute, 2015). The questions assessing attitudes toward oral health were developed internally to capture the value that the general public places on different aspects of oral health and dental care. To further validate the survey, the questions received input from several international experts in academia who have published extensively on defining and measuring oral health based on self-reported indicators. Questions regarding insurance and

access to care were adopted from a survey developed by the Healthy Policy Institute in 2014. Demographic questions were included as well (Health Policy Institute, 2015

The oral health survey in this study consisted of the questions created by the American Dental Association's Health Policy Institute. All of the questions from the oral health portion of the ADA survey were used, and inputted into Google Forms to make data collection and analysis electronic. Responses to questions were split up into three groups. Eight questions asking about participant's oral health or factors related to their oral health were grouped and scored together as Total Oral Health Score (TOH), with a maximum score of 75. One question, which asked about participants' knowledge about oral health, was scored separately as Total Knowledge Score (TK), with a maximum score of 8. One question, which related to participants' oral health and oral health outcomes, was scored as Total Perception of Oral Health score (TP), with a maximum score of 25. Lastly, one question, which inquired about what procedures a participant had done, was scored separately. Dental procedures, which were primarily cosmetic in function, were tallied and scored as cosmetic procedures, and procedures which reflected serious oral decay or health problems were tallied and scored as high-risk procedures.

Rosenberg Self-Esteem Scale

To measure the self-esteem of participants, the researchers used the Rosenberg Self-Esteem Scale (RSES). The cumulative Guttman type scale, which includes 10 questions, was originally developed by Morris Rosenberg to study high school students in New York State (Rosenberg, 1965). Participants answered questions as either "strongly disagree," "disagree," "agree," or "strongly agree." Questions 1, 3, 4, 7, and 10, were coded with "strongly disagree" as 1 to "strongly agree" coded as 4. Items 2, 5, 6, 8, and 9 were reversed scored. The scores from the 10 questions were summed two created total score. Question 5 was omitted from the survey.

To account for this mistake, the researchers replaced the missing score with the average of the other 9 questions. Higher total scores reflect higher self-esteem. The RSES has a Guttman scale coefficient of reproducibility of 0.92, indicating excellent internal consistency (Rosenberg, 1978). Furthermore, test-retest reliability over a 2 week period shows correlations of 0.85 and 0.88, demonstrating strong stability. In terms of validity, the RSES correlates significantly with measures such as the Coopersmith Self-Esteem Inventory, as well as with measures of depression and anxiety (Rosenberg, 1978). The RSES has been used in numerous studies worldwide, and is a standard for testing. In one study, the RSES was translated into 28 languages, and administered to nearly 17,000 participants across 53 nations. The RSES responses had minimal variability worldwide, and RSES scores correlated with neuroticism, extraversion, and romantic attachment across countries, providing additional support for cross-cultural equivalence of the RSES (Schmitt & Allik, 2005). Furthermore, with relevance to this study, researchers have determined that their findings "support the use of the RSES for the assessment of self-esteem in higher education" based on a study of 420 university students using the RSES (Martín-Albo, Núñez, Navarro, & Grijalvo, 2007). Scores on the RSES will from here on be referred to as Total Rosenberg scores (TR), with a maximum possible of 40 points.

Procedures

University participants were recruited from from undergraduate psychology classes. The professor notified students in four classes about the study and provided a survey web link through email. University participants received extra credit for their psychology classes in exchange for participation in the survey. All university participants took the survey through Google Forms, on any internet accessible device, at their leisure. Students first gave consent for participation, then completed the survey.

To collect data from the Free Clinic, a researcher went to the clinic with printed surveys, pencils, and clipboards. The researcher told patients in the waiting room the purpose of the survey and what to expect, and inquired about willingness to participate in the survey. Those willing to participate filled out a consent form, completed the survey, and were given a $5 Walmart gift card upon completion. Some patients refused the gift card. The completed surveys were then collected by the researcher, and each survey was input into Google Forums, in order to have all of data available electronically.

The researchers administered printed surveys at Swansea Dental Care (the town's only dental care provider). Data were collected on the day that Swansea Dental Care hosted a Free Dental Day, where the dentist provided free extractions to the first 20 patients in need. As the patients were given consent forms to receive treatment by the dentist, they were also given the study survey to complete as they waited for treatment. The researcher explained the purpose of the survey before the patients were given the survey. Consent was obtained prior to participation in the survey. When patients turned in their consent form to have a tooth extracted, they also turned in the completed survey. The researcher collected all surveys and entered all survey data into Google Forms.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences software from IBM (version 23). Descriptive statistics were compiled for all demographic variables. Researchers performed t-tests for equality of measures to compare USC population and non-USC population on dependent variables (Rosenberg Scores, Total Oral Health Score, etc). Planned analyses included multiple regressionsto analyze the relationship between predictor variables and self-esteem as well as predictor variables and oral health.

Results

Table 1 presents frequencies and percentages within the total sample for each of the categorical predictor variables. Sex, ethnicity, education, income, dental insurance, and health insurance are represented in this table. The majority of the sample was made up of participants who either had or were pursuing an undergraduate degree (91.7%). Those having completed high school only were second in representation (6.9%), while the other categories had only one or two respondents. Responses to income level, which measured personal or family income, were quite varied. The biggest group had income levels over $150,000 (22.2%), while the second largest had income levels under $25,000 (20.5%). Household income was reported as follows: 64 students reported over $150,000, 42 between $100,000 and $150,000, 36 between $50,000 and $100,000, and 30 between $25,000 and $50,000. Forty-five students reported not knowing family or individual income. Eighteen community participants reported an income under $25,000, with 7 more between $25,000 and $50,000, and 1 participant did not know her/his income. Only 1 person reported an income over $50,000. In the total sample 16.7% of participants did not know or did not want to disclose their income. A majority of participants had health insurance (88.9%), and the majority had dental insurance (76.7%) as well. Table 2 presents frequencies and percentages for cosmetic and high-risk procedures. The majority of participants had completed one or more cosmetic procedures (74%), while the majority did not report completing high-risk procedures (68.4%).

Table 1. Frequency counts and percentages for categorical predictor variables (n=287) Sex, Ethnicity, Education, Income, Dental Insurance, Health Insurance.

Variable	n	%
Sex		
Male	95	33.3
Female	192	66.7
Ethnicity		
White	211	73.3
Black	34	11.8
Asian/Pacific Islander	12	4.2
Native American	1	0.3
Hispanic	5	1.7
Mixed	21	7.3
Prefer not to answer	4	1.4
Education		
Less than High School	2	0.7
High School	20	6.9
College	264	91.7
Master's	1	0.3
PhD/other Doctoral	1	0.3
Income		
Less than $25,000	59	20.5
$25,000-50,000	37	12.8
$50,000-100,000	38	13.2
$100,000-150,000	42	14,6
Over $150,000	64	22.2
Unknown	48	16.7
Dental Insurance		
Yes	221	76.7
No	67	23.3
Health Insurance		
Yes	256	88.9
No	32	11.1

Table 2. Frequency counts and percentages for descriptive variables (n=287) Cosmetic procedures, high-risk procedures

Variable	n	%
Cosmetic Procedures		
0	75	26.0
1	149	51.7
2	53	18.4
3	9	3.1
4	2	0.7
High-risk Procedures		
0	197	68.4
1	79	27.4
2	12	4.2

Table 3 presents descriptive statistics, showing mean and standard deviations for outcome variables. TOH, TK, TP, and TR are shown in the table. The mean TOH score was approximately 66, which indicated relatively average high oral health in the sample. The mean of TK was 7, indicating high knowledge about oral health practices among the participants, and the mean of TP was 19.73, indicating that most participants perceived themselves to have moderate-to-high oral health, regardless of the actual condition of their oral health. The mean for TR was 28.75, representing average self-esteem skewed toward the maximum score among the sample.

Table 3. Descriptive statistics for age and outcome variables TOH, TK, TP and TR

Variable	M	SD
Total Oral Health Score	65.97	8.213
Total Knowledge Score	6.92	1.176
Total Perception Score	19.73	3.071
Total Rosenberg Score	28.75	4.05

An independent-samples t-test was conducted to compare the self-esteem scores for males and females. There was a significant difference in RS for males (M = 29.78, SD = 4.05) and females (M = 28.19, SD = 4.02); $t(285) = -3.14$, $p = .002$ (two-tailed). The magnitude of differences in the means (mean difference = -1.59, 95% CI: -2.59 to –0.59) was small to moderate (eta squared = 0.033).

An independent-samples t-test was conducted to compare the TOH for the USC population and non-USC population. There was a significant difference in TOH for USC (M = 67.03, SD = 7.16) and non-USC participants (M = 56.48, SD = 10.75); $t(286) = -7.10$, $p < .001$ (two-tailed). The magnitude of differences in the means (mean difference = -10.54, 95% CI: -13.47 to –7.62) was large (eta squared = 0.15).

Multiple regression was used to assess whether TOH and number of dental procedures (DP) could predict the Rosenberg self-esteem scores. The preliminary analyses did not indicate any violation of the assumptions of normality, linearity, multicollinearity, or homoscedasticity. TOH and DP predicted 2.2% of the variance, $F(2, 285) = 3.273$, $p = .039$. In this model, only TOH (beta = .146, $p = .014$) was significant in predicting self-esteem.

To assess whether TOH and household income (HI) could predict Rosenberg self-esteem scores a second multiple regression was used. The preliminary analyses did not indicate any violation of the assumptions of normality, linearity, multicollinearity, or homoscedasticity. TOH and HI predicted 2.3% of the variance, $F(2, 285) = 3.349$, $p = .037$. In this model, only TOH (beta = .14, $p = .02$) was significant in predicting self-esteem.

A third multiple regression was used to assess whether HI could predict TOH. The preliminary analyses did not indicate any violation of the assumptions of normality, linearity,

multicollinearity, or homoscedasticity. HI predicted 4.1% of the variance, F (1, 286) = 12.203, p =.039. In this model, only TOH (beta = .146, p = .001) was significant in predicting TOH.

Next, a multiple regression was used to assess whether TK and TP could predict TOH. The preliminary analyses did not indicate any violation of the assumptions of normality, linearity, multicollinearity, or homoscedasticity. TK and TP predicted 2.4% of the variance, F (2, 285) = 3.547, p =.03. In this model, only TP (beta = .158 p = .009) was significant in predicting TOH.

The next multiple regression was used to assess whether TK, TP, cosmetic dental procedures (CDP), and high-risk dental procedures (HDP) could predict TOH. The preliminary analyses did not indicate any violation of the assumptions of normality, linearity, multicollinearity, or homoscedasticity. This model predicted 11.1% of the variance, F (4, 283) = 8.824, $p < .001$. In this model, TP (beta = .141 p = .016), CDP (beta = .116 p = .045), and HDP (beta = -.288 $p < .001$) were significant in predicting TOH.

The last multiple regression was used to assess whether HI, dental insurance, and highest education could predict TOH. The preliminary analyses did not indicate any violation of the assumptions of normality, linearity, multicollinearity, or homoscedasticity. This model predicted 10.0% of the variance, F (4, 283) = 10.52, $p < .001$. In this model, dental insurance (beta = .178 p = .006), and highest education (beta = .135 p = .031) were significant in predicting TOH, while household income (beta = .103 p = .091) was marginally significant.

Discussion

Comparisons

The differences in self-esteem four male and female participants were especially noteworthy. Males reported higher self-esteem than females by almost two points. This marked difference between the genders could be several factors explained by. First, females generally tend to judge themselves more harshly as compared to males. Although males are starting to face greater societal pressures, women have historically been held to increasingly high beauty standards by society (American Psychological Association, 2011). Failure to meet these standards could easily result in poorer self-esteem. The emphasis on female appearance is significant especially on college campuses. It is not surprising that young women at this stage in life would report lower self-esteem than males. Finally, although the gap is finally starting to diminish, it has been recognized that females are valued more based on their appearance, while males are valued more based on their intellectual abilities (Kay & Shipman, 2014). When assessing self-esteem in a context generally dealing with appearance, in this case the appearance of the mouth, it is almost expected that women would be harsher on themselves than males.

Oral health comparisons between the university participants and community participants indicated that oral health was higher in University of South Carolina Students. Based on background research and other circumstantial evidence, this result was not surprising. Since the community sample wasrecruited from free service providers, these subjects were likely in a position where dental health was significantly compromised. Additionally, the community sample survey responses revealed that they had a much lower income than the primary population. One researchers points to the fact that income has a direct effect on the ability to access goods, services, and other resources that promote health (Sisson, 2007). Lower access to

care results in lower quality of care, and thus, poorer health outcomes. Another study has shown that low income, low socioeconomic status individuals and families, as well as minorities, are affected by oral health problems at a proportionately high rate (KCMU, 2012). Because the community sample was composed of a greater proportion of low income, low socioeconomic status individuals, as well as minorities, it was expected that oral health outcomes in this population would be poorer than in the University of South Carolina student population.

Regression Model Results

The main hypothesis addressed the relationship between oral health would be related to self-esteem, and as expected results of the regression indicated that oral health is a significant predictor of self-esteem. Previous research had suggested the relationship between oral health and self-esteem (Dumitrescu et al., 2012). Oral health influences facial expressions and talking—basically oral health affects the quality of social interaction. Those with better oral health appear to have better experiences with human interactions, and thus, have higher self-esteem (Huff et al., 2006). Studies have shown that when oral health is compromised, overall health, mental health, and quality of life may be diminished as well (Appollonio et al., 1997). With so much evidence supporting the idea, the researchers were not surprised to find a relationship between oral health and self-esteem.

Results also supported the hypothesis that income would be related to oral health. While this finding was expected, it reinforces the need for affordable dental care. As discussed before, notable gaps and disparities exist in access to care (U.S. Health and Human Services, 2000). Many poor oral health outcomes largely stem from the lack of resources available to pay for dental care, especially preventative dental care. Many individuals with low income cannot afford out of pocket costs. Furthermore, individuals with lower income may have difficulty acquiring

transportation to access dental offices, have difficulty getting time off from their jobs to visit dental offices, and have to spend their income on basic survival needs (e.g. food, shelter, etc.). Also, they may live in areas where their water supply lacks fluoridation, and their schools may not have the resources to teach proper dental care.

One surprising finding gained from the regression analyses is that income was not linked to self-esteem. Given that income predicted oral health and oral health predicted self-esteem, it seems logical that income should be related to self-esteem. Some studies have shown that higher SES individuals, on the whole, report higher self-esteem (Twenge & Campbell, 2002). While this finding is intuitive, there are existing studies that point to the idea that money can only buy happiness to a certain point. Beyond an income of $75,000, people do not report any greater degree of happiness. Individuals earning greater than $75,000 a year report greater life-satisfaction, but no greater happiness and individual satisfaction (Luscombe, 2010). Researchers have suggested this is due to the fact that after this certain point where money is no longer a concern, people are more likely to have mental health issues such as depression and anxiety because they are no longer concerned about "survival," and have more time to compare themselves to others and feel smaller and less successful, which may reflect negatively on self-esteem (Luscombe, 2010).

Our results did not indicate that the number of dental procedures a person had completed could predict self-esteem. E. Considering this result in terms of the relationship between oral health and self-esteem, number of procedures does not necessarily indicate good or poor oral health. Someone with great oral health may have had many procedures done—including braces, teeth whitening, or veneers; however, someone with great oral health may have had no procedures completed. Conversely, someone with very poor oral health may also have had many

procedures done—such as fillings, extractions, or root canals, yet others with poor oral health may not have endured any procedures. It may be the type of procedure performed that is important in indicating oral health status in self-esteem rather than the number of procedures performed

One of the most interesting findings in this study was that dental insurance and education together predicted more of the variance for oral health than any other variables. Relating to dental insurance, it has been discussed at length that those who have dental insurance have better oral health outcomes than those who do not (KCMU, 2012). Having dental insurance allows a person to lessen the cost of typically expensive dental procedures which may help to restore proper oral health. The participants' responses in this study provide support to previous findings about the importance of dental insurance. Income alone may not be the best predictor of oral health since not everyone with high income has access to dental insurance. What is troubling is that many people with health insurance still lack dental insurance. Over 12% of the people in our study had health insurance but no dental insurance. Given the importance of oral health in relation to overall physical health, it is time to consider the need for dental care to be treated the same as healthcare.

With regards to education, our study found the those reporting higher education often reported better oral health., Dewald (2016) reported that college students go to the dentist with more frequency than the general public. This trend among college students may be an explanation as to why education was significant to predicting oral health in this model. The majority of the participants in this study had, or were working to complete, an undergraduate education. Like the previous studies, the current study shows that higher education is linked to better oral health outcomes. Those who have more education and understand the importance of

care to health outcomes may make more of an effort to maintain proper care through professional cleanings. Those with the dental insurance to afford a proper routine of dental cleanings, which college educated people are more likely to do, will have higher oral health than those who do not have the means to get cleanings often. Also, those who attend college are likely to grow up and better environments where the water may be fluorinated in the schools may take time to teach them about oral health care.

Results did not indicate that nowledge of oral health could predict oral healthcare. A. Knowledge is necessary, but not sufficient, for behavior change. Motivation, as well as the means to afford care, are needed in addition to knowledge to achieve good oral health outcomes. Without motivation, a person is not likely to continue to engage in proper care on a daily basis, even if they have the knowledge about what they need to do in order to maintain good oral health. Without the means to pay for dental care, the person cannot seek treatment, even if they know that there is a problem. A regular professional cleaning and checkup schedule, which allows a person to maintain good oral health and be notified if any serious problems exist, may not be affordable to all of those who know the importance of oral health.

Results of the study indicated perception of oral health predicted oral health. Participants in the study seemed to have a solid grasp on their current oral health, and many oral health problems are likely recognizable by most people. When looking in the mirror, caries, decay, and gum disease will be present, and the mouth will look overall unhealthy, so they would likely evaluate their own oral health is poor. On the contrary, if one's mouth is not visibly diseased, it is probable that there are no serious oral health issues occurring; therefore, oral health would be perceived as healthy.

When taken together with the number of cosmetic procedures, perception of oral health predicted oral health. As discussed in the above paragraph, if one perceives their oral health to be healthy, it is likely that it is healthy in actuality. If a person has had many cosmetic procedures completed, such as braces or teeth whitening, odds are that the person will have bright, straight white teeth, which further contribute to the perception of having good oral health. Taken together, these two factors will lead that person to self-report having better oral health. On the reverse, the regression found that perception of oral health and high-risk procedures also predicted oral health. In this case, however, results predicted low oral health. A person who has to have high-risk procedures like extractions likely has serious oral health problems, specifically decay and disease. Once again referring to the above paragraph, this person, who has presence of disease in the mouth, would easily be able to notice its occurrence. Poor oral health would likely lead the person to have high-risk procedures completed, which would reinforce the idea that the person has poor oral health. Thus, when asked to self-report oral health, the person would report that their oral health is poor.

Strengths

This study had several aspects that allowed it to be particularly effective. First and foremost, the survey used in this study was based on two existing, established questionnaires. The Rosenberg Self-Esteem Scale has been used in numerous studies and is a standard for self-esteem testing around the world, with excellent internal consistency and strong stability. The self-esteem scores in this study, gleaned from this scale, are presumed to be valid. Furthermore, the ADA's Oral Health Survey Questions have also been used in many studies and have been found to be effective. Using the questions from the ADA allows our study to have external validity in terms of the oral health component, as the survey was designed by oral healthcare

professionals. A large sample size provided adequate statistical power. The sample of students at the University of South Carolina was representative of the university population. Specifically, the race in this sample was very similar to that reported by university officials, indicating that our sampling was successful. Having a survey that can be completed quickly and easily helped ensure a high response rate with few missing data points. Since the survey method was inexpensive, it allowed the researchers to sample a large group of participants with a minimal budget. Lastly, the findings indicate that the study's results were similar to other studies with regards to the relationship between self-esteem and oral health.

Limitations

Several limitations may have hindered the effectiveness of the study. The first limitation was the imbalance of the ratio of males to females in the sample. Two thirds of the participants were female, and over 68% of the USC population was female. As discussed earlier, the average self-esteem score in females was nearly a full two points lower than in males. Since such a large proportion of the USC sample was female, it is feasible that the average self-esteem score was lower than if the sample had been half male and half female. This imbalance may be one of the reasons why self-esteem did not differ greatly between the two populations.

A second limitation involved how data were collected in the community sample. Anecdotal reports from the researcher collecting the data indicated that some of the participants were self-conscious when filling out the survey. The effect of the researcher may have resulted in self-esteem scores that were artificially high since the participants may have been self-conscious about their responses. Many of these participants were wary of technology, and thus paper-surveys were used to collect the majority of the data from these participants. Although the survey responses were anonymous, participants may have felt their answers were not fully private. The

participants may have been embarrassed to know that their answers would be read, and thus they may have answered higher on the self-esteem scale than they may have in a private setting. Using a private room may have helped alleviate this problem.

The community sample was considerably smaller than the university sample. When making comparisons between university participants and community participants, it is difficult to analyze the data when there is such a large discrepancy in the number of participants for each group. Further analysis may look at the university sample separately from the community sample. Future studies may find that university students have a different relationship between their oral health and self-esteem as compared to people in a community sample. Because a population consisting of only college students is not representative of Columbia, SC on a whole, looking at a larger community sample would likely make results more applicable to the entire population.

Furthermore, the secondary population may not have cared as much about the appearance of their smile. As demonstrated above, SES is linked to oral health (KCMU, 2012). Thus, lower-income participants are likely in an environment where they are surrounded by those who have generally poorer oral health. Their friends and family may have similar oral health concerns, thus they may not care that their teeth are not perfect. Less concern about their oral health may lead to higher self-esteem scores. In the college population, dental aesthetics may be more important. When pursuing intimate relationships, having a nice smile is considered desirable. One may be more affected by the fact that he or she does not have an aesthetically pleasing smile, and this awareness may negatively affect self-esteem. This study failed to ask participants about the importance of dental aesthetics and oral health. Future studies should consider asking

participants about the importance of dental aesthetics and oral health. The response to these questions may affect the relationship between oral health and self-esteem.

Another limitation of this study is that people may not have made the connection between self-esteem and oral health when initially completing the Rosenberg Self-Esteem portion of the survey. If participants had answered the oral health survey questions first, they may have responded differently to the self-esteem measure as a result of the condition and appearance of their mouths. The researchers believe that the order of the self-esteem questions and the oral health questions may have had a significant impact on participant responses. Future studies should consider counterbalancing the survey components to ensure that order effects or unrelated to self-esteem responses.

Another limitation of the study was the homogeneity of the sample. The majority of the sample were white, college-educated, higher-income individuals, which is not representative of the Columbia population as a whole. If the sample had been larger and taken from more diverse areas of Columbia, the results would be more generalizable.

Lastly, the missing question from the Rosenberg Self-Esteem scale may have altered the self-esteem results. The forgotten question, number 5, stated, "I certainly do not have much to be proud of" (Rosenberg & Pearlin, 1978). As a unique question open to different interpretations, the absence of the question could have definitely affected overall scores. By leaving a question off the self-esteem section of the survey and still using the same measurement tools, the results of each individual's self-esteem score were not entirely accurate.

Future Direction

Moving forward, many changes could be made to the study in order to address the limitations stated above. First and foremost, the study could be replicated using the complete

Rosenberg Self-Esteem Scale to obtain more robust self-esteem scores. After analyzing the results of the survey, the researchers wondered if the community sample did not care as much about the appearance of their smile because they are surrounded by people who also lack oral health/hygiene. This population was maybe not as hard on themselves as some of the college student participants where good oral health is expected. To answer this question, the researchers would incorporate more targeted questions in the future which would accurately gage how important oral health is to the individual. An idea for a new, related study that the researchers had was to mirror this study, but instead focus on the general population of Columbia instead of just the University population. This study would result in less biased results, allowing them to be more applicable to the final population of Columbia. Finally, the researchers believe that the study would benefit if, instead of self-reporting oral health, a dentist could perform the oral health evaluation. This would result in a more accurate depiction of an individual's actual oral health status, and make the results less subjective.

Summary and Implications

Upon investigation of the relationship between self-esteem and oral health, there are some implications regarding the types of interventions that should be put in place and who the targets of the interventions should be. Findings that show self-esteem related to self-rated oral health will enable dental clinicians to better understand the individual psychological factors associated with self-rated oral health and the practice of good oral hygiene (Dumitrescu et al., 2012). Such findings will guide interventions to distinguish between situations where individuals lack the motivation to change their oral hygiene behavior and those who are motivated but require support in planning and maintaining behavior change—lack of motivation vs. lack of volition (Dumitrescu et al., 2012). Health education should emphasize the positive individual

issues and associate good oral hygiene with personal well-being, satisfaction, and positive self-esteem (Honkala, et al., 2007). Individuals with low socioeconomic status are at risk for poor oral health and lower self-esteem. One researcher suggests that health education/promotion strategies should enhance autonomy, self-respect, and self-esteem in an effort to improve the outcomes of interventions designed to improve the health behaviors and health of marginalized groups (Marmot, 2003). The results of this particular study support all of these aforementioned findings, and the researchers believe the suggested interventions would be effective in each of the scenarios listed, based on the findings of this study. Furthermore, this study demonstrates the importance of dental insurance on oral health, as dental insurance was one of the most significant predictors of oral health among the sample population. Since dental care is an important part of overall health care, it is necessary in order for a complete, health individual to visit the dentist regularly, which is most affordable when an individual has dental coverage. The same political importance that is attached to health insurance should also be added to dental insurance.

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Appendix A

Consent Form for Participation in a Research Study
University of South Carolina

Title of Study: Relationship between self-reported oral health and self-confidence

Description of the research and your participation
You are invited to participate in a research study conducted by Beth Smith and Matthew Ablonczy, under the direction of Dr. Mike McCall. This research is being done to fulfill the requirements for graduation from the South Carolina Honors College. The purpose of this research is to examine how self-perception of oral health influences self-confidence levels.

If you decide to participate, your participation will involve completing an online survey. This survey will involve providing very general demographic information about yourself (such as age and gender) and completing a section designed to measure general measures of oral health. Additionally, there will be questions regarding your perception of confidence and self-esteem. The amount of time required for your participation will be approximately 10 minutes.

Risks and discomforts
There are no known risks associated with this research. There is no cost to participate and there is no travel required.

Protection of confidentiality
Participation will be anonymous which means that no personal identification (name, email address, phone number, etc.) will be taken and your answers will not be able to be traced back to you.

Voluntary participation
Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study after you begin.

Contact information
If you have any questions or concerns about this study, please contact Beth Smith at ems1@email.sc.edu or Matthew Ablonczy at mza@email.sc.edu or Dr. Mike McCall at mccallmw@mailbox.sc.edu. If you have any questions about your rights as a research participant, you may contact the Office of Research Compliance at the University of South Carolina at 803-777-7095.

Thank you for your consideration. If you wish to participate, please follow the provided link and follow the instructions.

Appendix B

Survey

Rosenberg Self-Esteem Scale

Instructions Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

1. On the whole, I am satisfied with myself.

Strongly Agree Agree Disagree Strongly Disagree

2. At times I think I am no good at all.

Strongly Agree Agree Disagree Strongly Disagree

3. I feel that I have a number of good qualities.

Strongly Agree Agree Disagree Strongly Disagree

4. I am able to do things as well as most other people.

Strongly Agree Agree Disagree Strongly Disagree

5. I feel I do not have much to be proud of.

Strongly Agree Agree Disagree Strongly Disagree

6. I certainly feel useless at times.

Strongly Agree Agree Disagree Strongly Disagree

7. I feel that I'm a person of worth, at least on an equal plane with others.

Strongly Agree Agree Disagree Strongly Disagree

8. I wish I could have more respect for myself.

Strongly Agree Agree Disagree Strongly Disagree

9. All in all, I am inclined to feel that I am a failure.

Strongly Agree Agree Disagree Strongly Disagree

10. I take a positive attitude toward myself.

Strongly Agree Agree Disagree Strongly Disagree

Oral Health Survey Questions

1. How would you describe the condition of your mouth and teeth?

Poor Fair Good Very Good Don't Know

2. How often during the past 12 months have you felt that life in general was less satisfying because of problems with your mouth and teeth?
   Never Rarely Occasionally Very Often Don't Know

3. Have you ever felt that the appearance of your mouth and teeth affected your ability to interview for a job?
   Yes No Don't Know

4. Have you ever felt that the appearance of your mouth and teeth affected your ability to have a relationship with:
   a. Family Yes No Don't Know
   b. Friends Yes No Don't Know
   c. Romantic Partners Yes No Don't Know

5. How often have you experienced each of the following problems related to your mouth and teeth during the past 12 months?
   a. Difficulty when biting or chewing foods
      Never Rarely Occasionally Very Often Don't Know
   b. Difficulty with speech or trouble pronouncing words
      Never Rarely Occasionally Very Often Don't Know
   c. Felt anxiety or embarrassment
      Never Rarely Occasionally Very Often Don't Know
   d. Avoided Smiling
      Never Rarely Occasionally Very Often Don't Know
   e. Took days off work because of pain or discomfort
      Never Rarely Occasionally Very Often Don't Know
   f. Reduced participation in social activities
      Never Rarely Occasionally Very Often Don't Know
   g. Problems Sleeping
      Never Rarely Occasionally Very Often Don't Know
   h. Experienced pain
      Never Rarely Occasionally Very Often Don't Know

6. Are the following statements true or false? If you are not sure, please make your best guess.
   a. Some medical conditions like diabetes affect the health of your mouth
      True False
   b. People who smoke are more likely to have cancer in their mouth
      True False
   c. Children do not need to see a dentist until they start school
      True False

d. Because they do not stay in your child's mouth very long, baby teeth are not that important
   True False
e. Some medicines can affect the health of your mouth
   True False
f. Blood on your toothbrush is a sign of gum disease
   True False
g. If I am not having any pain in my mouth, then my mouth is disease free
   True False
h. Sugary foods and drinks cause tooth decay
   True False

7. How strongly do you agree or disagree with the following statements about how you perceive the health of your mouth?
   a. I value keeping my mouth healthy
      Strongly Disagree Disagree Agree Strongly Agree Don't Know
   b. Regular visits to the dentist will help keep me healthy
      Strongly Disagree Disagree Agree Strongly Agree Don't Know
   c. As I grow old I accept that I will lose some of my teeth
      Strongly Disagree Disagree Agree Strongly Agree Don't Know
   d. I need to see the dentist twice a year
      Strongly Disagree Disagree Agree Strongly Agree Don't Know
   e. It is easier to get ahead in life if I have straight bright teeth
      Strongly Disagree Disagree Agree Strongly Agree Don't Know

8. Do you have a single dentist or dental office that is your usual source of dental care?
   Yes No

9. How long since you last had a dental visit
   < 12 months 1-2 years 3-5 years >5 years Never

10. Do you plan to visit the dentist in the next 12 months?
    Yes No Not sure

11. If last dental visit was more than 12 months ago, why did you not visit the dentist more frequently? Select all that apply.
    a. My mouth is so healthy so I do not need to visit the dentist
    b. I do not know where to go to receive dental services
    c. I cannot afford to go to the dentist
    d. It is too hard to find a dentist that accepts my dental plan or Medicaid
    e. I cannot find the time to go to a dentist
    f. Many services are not covered by my dental plan or Medicaid, so I end up having to pay with my own money

   g. I cannot travel to a dentist easily
   h. I do not have any of my original teeth
   i. I am afraid of going to the dentist
   j. Other
   k. No reason
   l. Not applicable
12. How often did your parents or legal guardians go to the dentist?
   a. Several times a year
   b. Once a year
   c. Once every few years
   d. Never
   e. Don't know
13. Have you ever knocked out a tooth as a result of an accident?
   a. Yes
   b. No
14. Have you ever chipped a tooth as a result of an accident?
   a. Yes
   b. No
15. Have you ever had any of these common dental procedures done? (Circle as many as apply)
   a. Filling
   b. Crown
   c. Bridge
   d. Sealant
   e. Gum surgery
   f. Veneers
   g. Implant
   h. Braces
   i. Root Canal
   j. Tooth extraction
   k. Wisdom teeth removal
   l. Dentures
   m. Teeth whitening

Demographic Questions

1. What is your current age? (Open ended)

2. What is your biological sex?
   a. Male
   b. Female

3. What is your marital status?
    a. Married
    b. Divorced
    c. Single
    d. Widow/Widower
    e. Separated
    f. Prefer not to answer

4. What is the highest level of education you have achieved (or are currently working on)?
    a. Less than High School
    b. High School
    c. College
    d. Master's
    e. PhD/other doctoral degree

5. What is your race/ethnicity?
    a. White
    b. Black
    c. Asian/Pacific Islander
    d. Native American
    e. Hispanic
    f. Prefer not to answer

6. Do you have health insurance?
    a. Yes
    b. No

7. Do you have dental insurance?
    a. Yes
    b. No

8. Which of the following best describes your annual household income?
    a. >$25,000
    b. 25,000-50,000
    c. 50,000-100,000
    d. 100,000-150,000
    e. 150,000+
    f. Unknown

Appendix C

Study Summary for Participants

Relationship between self-reported oral health and self-confidence

This research was conducted by Beth Smith and Matthew Ablonczy, under the direction of Dr. Mike McCall, for fulfillment of the senior thesis with the South Carolina Honors College.

The focus of this research was to examine how a person's self-reported oral health affects his or her self-confidence and self-esteem.

Participants in this study were asked to answer questions and about oral health, self-confidence, and demographics. This research was conducted in order to determine if there are any patterns among oral health and self-confidence levels.

If you have any additional questions concerning this research, please contact Beth Smith at ems1@email.sc.edu or Matthew Ablonczy at mza@email.sc.edu or Dr. Mike McCall mccallmw@mailbox.sc.edu.